

GOELDIANA

Zoologia

Número 14

**A New Species of Marmoset, Genus *Callithrix* Erxleben, 1777
(Callitrichidae, Primates) from the Rio Maués Region, State of
Amazonas, Central Brazilian Amazonia**

Russell A. Mittermeier
Marco Schwarz
José Márcio Ayres

12 de Outubro de 1992





SciELO





A New Species of Marmoset, Genus *Callithrix* Erxleben, 1777 (Callitrichidae, Primates), from the Rio Maués Region, State of Amazonas, Central Brazilian Amazonia

Russell A. Mittermeier¹

Marco Schwarz²

José Márcio Ayres³

ABSTRACT — A new species of marmoset, *Callithrix mauesi* sp. n., is described from the west bank of the Rio Maués, Amazonas state, central Brazilian Amazonia. The animal is a member of the *Callithrix argentata* group of marmosets, which includes *C. argentata*, *C. leucippe*, *C. melanura*, *C. emiliae*, *C. humeralifera*, *C. chrysoleuca*, *C. intermedia*, and the recently described *C. nigriceps*. It appears to be most closely related to *C. humeralifera* and *C. chrysoleuca*, but is easily distinguished from them. The most readily noticeable differences are in the shape and nature of the ear tufts, the darker pelage color, and the absence of a distinct, light-colored mantle. The two groups of *C. mauesi* observed in the wild were in dense primary forest. The species does not appear to be endangered at this time. With its discovery, the total number of species of *Callithrix* is increased to 15, of which 14 are endemic to Brazil. The total number of primate species for Brazil as a whole increases to 68, by far the highest in the world, with 30 (44.1%) being endemic.

KEY WORDS — primates, Callitrichidae, marmoset, *Callithrix mauesi* sp. n., *Callithrix humeralifera*, *Callithrix chrysoleuca*, Brazil, Amazonia.

RESUMO — Descrição de uma nova espécie de sagüi, *Callithrix mauesi* sp. n., da Amazônia Central Brasileira, margem ocidental do Rio Maués, Amazonas. O animal é um membro do grupo de sagüis *Callithrix argentata* (que inclui *C. argentata*, *C. leucippe*, *C. melanura*, *C. emiliae*, *C. humeralifera*, *C. chrysoleuca*, *C. intermedia* e a recentemente descrita *C. nigriceps*). Esta espécie parece ter maior parentesco com *C. humeralifera* e *C. chrysoleuca*, ainda que muito distinta destas. As diferenças mais notáveis se relacionam ao formato e natureza dos tufo das orelhas, à cor mais escura da pelagem e à ausência de uma manta de cor clara. Os dois únicos grupos de *C. mauesi* observados foram encontrados em floresta primária densa. A espécie não parece estar em perigo de extinção no momento. Com esta descoberta, o número total de *Callithrix* cresceu para 15, dos quais 14 são endêmicos do Brasil. O número total de espécies de primatas existentes no Brasil cresceu para 68, de longe a mais alta ocorrência de primatas no mundo. Destas espécies, 30 (44.1%) são endêmicas.

PALAVRAS-CHAVE — primates, Callitrichidae, sauí, *Callithrix mauesi* sp. n., *Callithrix humeralifera*, *Callithrix chrysoleuca*, Brasil, Amazônia.

¹Conservation International, 1015 18th St., N.W., Washington, D.C. 20036, U.S.A.

²Zoobotânico Marco Schwarz, Caixa Postal 18.004, 80.511 Curitiba-PR, Brazil.

³Museu Paraense Emílio Goeldi, Av. Magalhães Barata, 376, 66.040 Belém-Pará, Brazil; and Wildlife Conservation International, New York Zoological Society, Bronx, NY 10460.

INTRODUCTION

The marmoset genus *Callithrix* Erxleben, 1777, is an almost exclusively Brazilian group of monkeys with 13-14 distinct taxa recognized to date, including a new species, *Callithrix nigriceps*, just described from the state of Rondônia by Ferrari and Lopes (1992). Two major revisions of this genus have been carried out in the last two decades, one by Hershkovitz (1977), which recognized only three species and 11 taxa, and the other by de Vivo (1988, 1991), which recognizes 12 taxa and elevates them all to full species status. Mittermeier *et al.* (1988) agree with de Vivo's decision to elevate five eastern Brazilian taxa of *Callithrix* (*jacchus*, *penicillata*, *geoffroyi*, *flaviceps*, *aurita*), something that had been recommended by Coimbra-Filho and Mittermeier (1973) 15 years earlier, and also recognize a sixth species, *C. kuhlii*, which de Vivo does not consider valid. Mittermeier *et al.* (1988) did not have the opportunity to review de Vivo's work on the *Callithrix argentata* group at the time they went to press, and continued to recognize only three species and seven taxa for these Amazonian/central Brazilian monkeys. However, we now concur with his decision to recognize all of these as full species as well. (See Table 1 for a comparison of these three classification schemes, and the one adopted in this paper.)

The purpose of this paper is to describe yet another distinct species from Brazilian Amazonia, *Callithrix mauesi*, from the region of the Rio Maués, Amazonas state, central Brazilian Amazonia (Figs. 1, 2, 3, 4, 8a). This species is most closely related to *Callithrix humeralifera* and *Callithrix chrysoleuca* (Figs. 8b, 8c, 9), with which it is parapatric, and occurs within the area shown in Hershkovitz's map (1977, p. 569) as part of the range of *C. humeralifera*. However, it is quite different from both of these species, which are more closely related to one another, and clearly deserves recognition as a full species.

This new species was first discovered by Marco Schwarz on April 15, 1985, during a field trip to the region. He observed two groups of the animals and succeeded in obtaining seven live specimens (Table 2), one of which is the adult male now being designated as the holotype (skin, skull). Five remained in the region while a female was transported with the holotype to Schwarz's collection at Morretes in the state of Paraná, Brazil. The female and two offspring born in captivity are still alive in that collection.

Table 1. Comparisons of the taxonomic arrangements for *Callithrix* in Hershkovitz (1977), de Vivo (1988, 1991), Mittermeier *et al.* (1988), and this paper.

Hershkovitz (1977)	Mittermeier <i>et al.</i> (1988)	de Vivo (1988, 1991)	This paper
<i>Callithrix jacchus</i> group			
<i>Callithrix j. jacchus</i>	<i>Callithrix jacchus</i>	<i>Callithrix jacchus</i>	<i>Callithrix jacchus</i>
<i>Callithrix j. penicillata</i>	<i>Callithrix penicillata</i>	<i>Callithrix penicillata</i>	<i>Callithrix penicillata</i>
<i>Callithrix j. geoffroyi</i>	<i>Callithrix geoffroyi</i>	<i>Callithrix geoffroyi</i>	<i>Callithrix geoffroyi</i>
<i>Callithrix j. flaviceps</i>	<i>Callithrix flaviceps</i>	<i>Callithrix flaviceps</i>	<i>Callithrix flaviceps</i>
<i>Callithrix j. aurita</i>	<i>Callithrix aurita</i>	<i>Callithrix aurita</i>	<i>Callithrix aurita</i>
	<i>Callithrix kuhlii</i> ¹		<i>Callithrix kuhlii</i>
<i>Callithrix argentata</i> group			
<i>Callithrix a. argentata</i>	<i>Callithrix a. argentata</i>		<i>Callithrix argentata</i>
<i>Callithrix a. leucippe</i>	<i>Callithrix a. leucippe</i>	<i>Callithrix leucippe</i>	<i>Callithrix leucippe</i>
<i>Callithrix a. melanura</i>	<i>Callithrix a. melanura</i>	<i>Callithrix melanura</i>	<i>Callithrix melanura</i>
	<i>Callithrix emiliae</i> ²	<i>Callithrix emiliae</i>	<i>Callithrix emiliae</i>
			<i>Callithrix nigriceps</i>
<i>Callithrix h. humeralifer</i>	<i>Callithrix h. humeralifer</i>		<i>Callithrix intermedia</i> ⁴
<i>Callithrix h. chrysouleuca</i>	<i>Callithrix h. chrysouleuca</i>	<i>Callithrix humeralifera</i> ³	<i>Callithrix humeralifera</i>
<i>Callithrix h. intermedius</i>	<i>Callithrix h. intermedius</i>	<i>Callithrix chrysouleuca</i>	<i>Callithrix chrysouleuca</i>
			<i>Callithrix mauesi</i>

¹Considered to be a hybrid population between *C. penicillata* and *C. geoffroyi* by Hershkovitz (1977) and not recognized by de Vivo (1988, 1991), but believed to be a valid taxon by Coimbra-Filho and Mittermeier (1973) and Mittermeier *et al.* (1988).

²Considered part of *C. argentata melanura* by Hershkovitz (1977), but recognized as valid by de Vivo (1985) and Avila-Pires (1986), and then by Mittermeier *et al.* (1988).

³De Vivo (1988, 1991, pp. 41, 43) pointed out that the generic name *Callithrix* is feminine, and corrected the spellings of *humeralifera* and *intermedia* accordingly, a step that we follow here.

⁴Hershkovitz (1977, pp. 1020-21) first describes *Callithrix humeralifer intermedius* as a subspecies of *C. humeralifer*, and depicts it as "intermediate" in pigmentation between *C. h. humeralifer* and *C. h. chrysouleuca* and having an annulated tail (Hershkovitz, 1977, p. 570). However, de Vivo (1988, 1991) points out that *intermedia* lacks tail bands, and furthermore that its ear tufts are relatively poorly developed. He notes, therefore, that if *intermedia* is "intermediate" in any way, it is more intermediate between the group formed by *melanura*, *emiliae*, *argentata* and *leucippe* (and the recently described *nigriceps*), with their bare ears and unbanded tails, and the group made up of *humeralifera* and *chrysouleuca* (and *mauesi*), with their annulated tails and well-developed ear tufts, than between *humeralifera* and *chrysouleuca* themselves. It may be useful in the future to recognise two different subgroups of Hershkovitz's (1977) "*C. argentata* group": a "*C. humeralifera* subgroup" consisting of the hairy-eared, tail-banded *C. humeralifera*, *C. chrysouleuca* and *C. mauesi*, and a "*C. argentata* group" composed of the bare-eared, monochrome-tailed *C. argentata*, *C. melanura*, *C. emiliae*, *C. nigriceps* and *C. leucippe*, but this will depend on a better understanding of the phylogenetic position of the poorly known *C. intermedia*.



Figure 1. Photograph of a live, late juvenile male *Callithrix mauesi* (photo by R.A. Mittermeier).



Figure 2. Different views of two live individuals of *Callithrix mauesi* (photos by R.A. Mittermeier).

Callithrix mauesi sp. n.

Holotype: MPEG 22177, adult male, stuffed skin, skull. Collected by Marco Schwarz on April 15, 1985, at the type locality.

Type Locality: West bank of the Rio Maués-Açú, directly across the river from the town of Maués, Amazonas state, Brazil (Fig. 5). This region is located in central Brazilian Amazonia, south of the Rio Amazonas and between the Rio Madeira and the Rio Tapajós (Fig. 6). Coordinates for the type locality are 3°23'S, 57°46'W.

Geographical distribution: The species is thus far known only from the immediate vicinity of the type locality. However, based on information from people working in the region, it appears to be found along the Rio Maués to the south of the type locality and also to the west as far as the Rios Urariá and Abacaxis (Fig. 5). Its range would thus appear to be entirely enclosed within the range given for *C. humeralifera* by Hershkovitz (1977, p. 569).

Habitat: The two groups observed in the wild were found in dense primary forest. No further details on habitat are available at this time.

Diagnosis: A marmoset of the *Callithrix argentata* group (*sensu* Hershkovitz, 1977), but quite distinct from its closest relatives, *C. humeralifera* and *C. chrysouleuca*, with which it is parapatric. The darkest (and least advanced phaeomelanically, *sensu* Hershkovitz, 1977) of these three species, it is especially distinguished by the shape and placement of the ear tufts and their erect, "neatly trimmed" appearance relative to *C. humeralifera* and *C. chrysouleuca*, by its darker coloration, and by the absence of the characteristic light mantle of *C. humeralifera* (Figs. 1, 2, 3, 4, 8, 9). The light orange tint to the underparts also distinguishes *C. mauesi* from *C. humeralifera*, whereas *C. mauesi* and *C. chrysouleuca* are easily distinguished both by the shape of the ear tufts and by coloration, *C. chrysouleuca* being an entirely white animal. The differences between *C. mauesi* and its two relatives can be easily seen in the color illustrations in Figs. 1 and 8 and the photos in Figs. 2, 4, and 9.

Description of the holotype: Face thinly haired and distinctly pinkish in color in life (the pink disappearing in the dry skin); an area of black circumbuccal hairs begins at the edge of the nostrils and extends to the chin; immediately lateral to these are larger cheek patches of dirty silvery brown; crown very dark brown grading to silvery gray in the occipital area and the forehead; a dark brown swatch is located at the center of the forehead and is flanked by lighter areas of dirty silvery brown; zonation of hairs in these areas of dirty silvery brown is dark brown at base with silvery tip (Figs. 3, 4). Back and shoulders lacking the distinct whitish mantle characteristic of *humeralifera*; shoulders to mid-back marbled very dark brown and white, the marbling being far more evident in live animals than in skins; zonation of hairs on the back is black-white-black, which provides the marbled pattern (Fig. 2). Upper back and shoulders have a slight reddish tint compared to the lower back. Light silvery hip patch present as in *C. humeralifera*, but not especially distinct; thighs and lower legs silvery gray in live animals with a black base-silvery tip zonation; feet slightly darker than legs and with a faint orange tint. Tail black with faint alternating bands of dirty

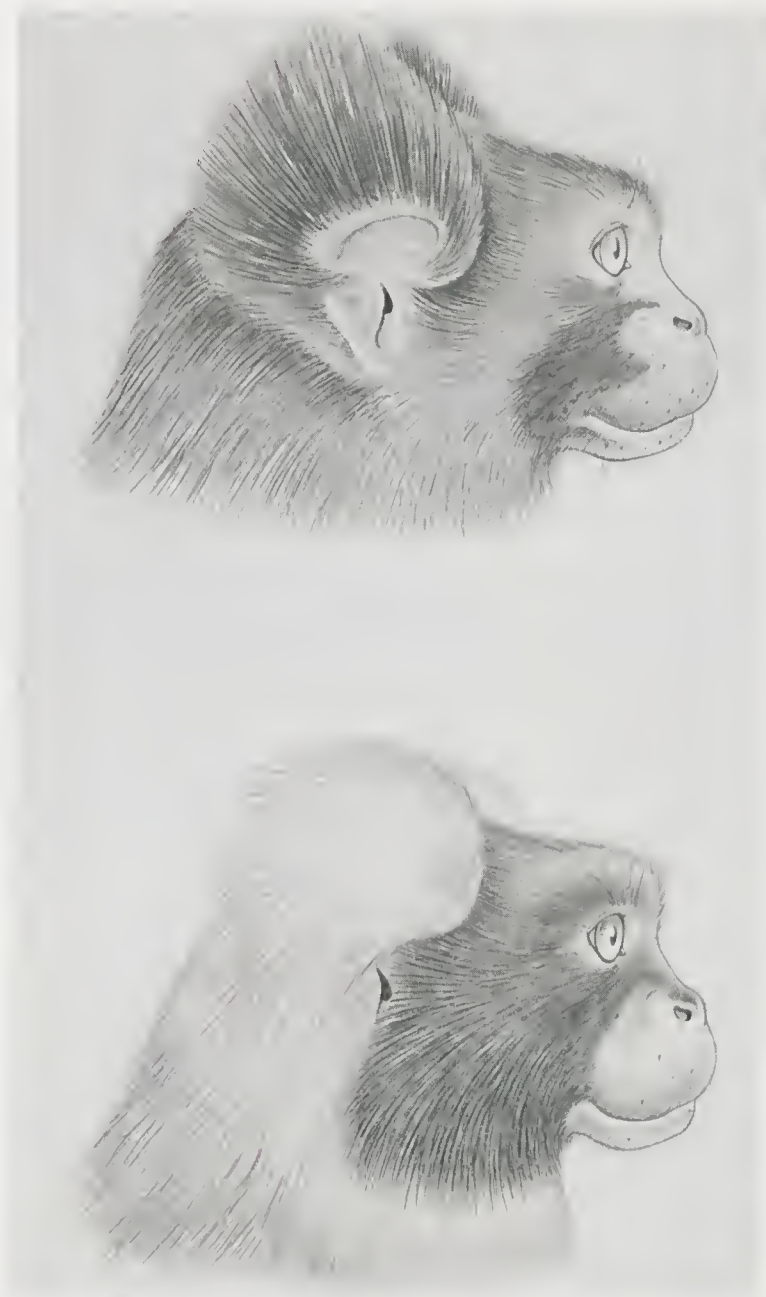


Figure 3. Lateral views of the head and ear region of *Callithrix mauesi* (above) and *Callithrix humeralifera* (below). Note especially the differences in patterns of emergence of hair in the ear region and the muzzle pigmentation (illustration by Stephen D. Nash).

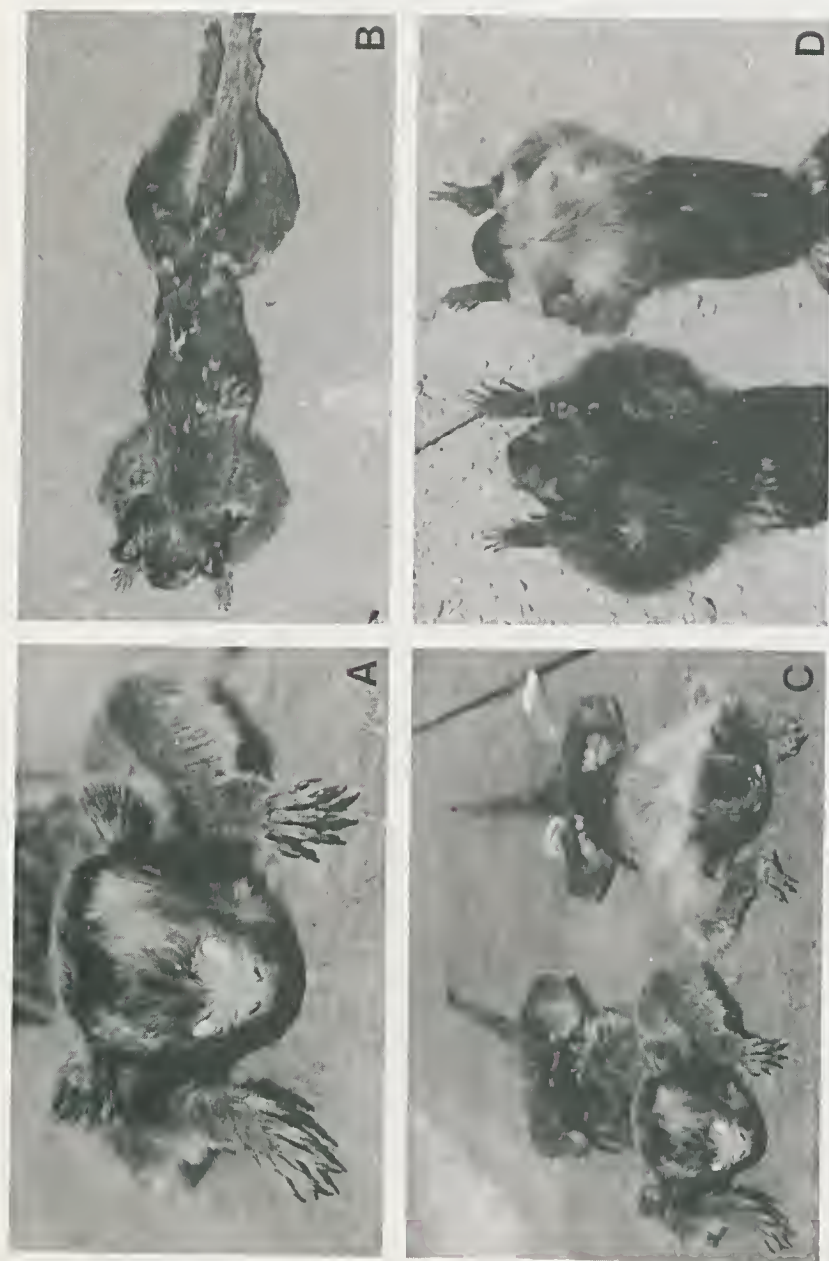


Figure 4. Photographs of the skin of the holotype of *C. mauesi* and a *C. humeralifera* for comparison (photos by R.A. Mittermeier).
 a. Frontal view of the face, ears and hands of *C. mauesi*.
 b. Dorsal view of *C. mauesi*.
 c. Frontal views of *C. mauesi* (left) and *C. humeralifera* (right). Note especially the differences in the ear region and the mantle.
 d. Dorsal views of the head, arms and upper body of *C. mauesi* (left) and *C. humeralifera* (right). Note especially the differences in coloration of the back of the head and the mantle.

silvery gray and black, the bands being much more evident in the living animal than in the skin (Figs. 2,8). Underparts buffy with distinct orange tint, more so than in *C. humeralifera*. Arms in the live animal dark brown washed with dirty silvery coloration, the zonation of hairs being dark brown at base with silvery tips; hands slightly darker than arms. Scrotum pinkish white in the live animal, the pinkish color disappearing in the dry skin. Pinna with dirty silvery brown hairs emerging mainly from the inner part of the ear, with some hairs growing on the dorsal surface as well; hair long on upper part of ear, short at bottom; the tufts cover the pinna entirely but have an erect, "neatly trimmed" appearance quite distinct from the tassels of *C. humeralifera* and *C. chrysoleuca* (Figs. 3, 4). (The three living specimens resemble the adult male holotype in every detail, with minor variations in distinctiveness of the tail bands and marbling on the back, and in the shape of the dark forehead patch.) Weight of adult male holotype: 375 g. Body measurements of adult male holotype: head-body length - 207 mm; tail length - 350 mm; hind foot - 64 mm; hand - 43 mm; ear - 34 mm. (See Table 2 for measurements of six other individuals.) Skull and dentition resemble those of other members of the *C. humeralifera* group, but detailed statistical comparisons have not yet been made because only one *C. mauesi* skull is available (Fig. 7). Its measurements are given in Table 3.

Origin of the name: This monkey is thus far known only from the type locality on the west bank of the Rio Maués-Açú, across the river from the town of Maués in central Brazilian Amazonia. It is named after this river, to place it geographically relative to its congeners. The name *Maués-Açú* simply means "large Maués" in Tupi-Guaraní, the *Maués-Açú* being a widening of the Rio Maués in the vicinity of the town of the same name.

Vernacular name: This marmoset is referred to as *sauim* or *souim* by the local people, these being the names most often used for marmosets in Brazilian Amazonia. For an English name, we suggest Rio Maués marmoset.

Table 2. Measurements and weights of seven adult specimens of *Callithrix mauesi* (in millimeters).

Sex	Head-body	Tail	Hind foot	Hand	Ear	Weight
Male (holotype)	207	350	64	43	34	375 g
Male	198	341	63	42	32	-
Male	212	376	63	41	-	315 g
Male	226	356	66	44	30	-
Female	211	346	59	42	37	-
Female	214	339	66	38	-	390 g
Female	226	356	64	46	-	405 g

TYPE LOCALITY AND PRESUMED DISTRIBUTION OF *CALLITHRIX MAUESI*



Figure 5. Location of the type locality and presumed distribution of *Callithrix mauesi* in central Brazilian Amazonia (illustration by Stephen D. Nash).

GEOGRAPHICAL DISTRIBUTION OF THE *CALLITHRIX ARGENTATA* GROUP¹

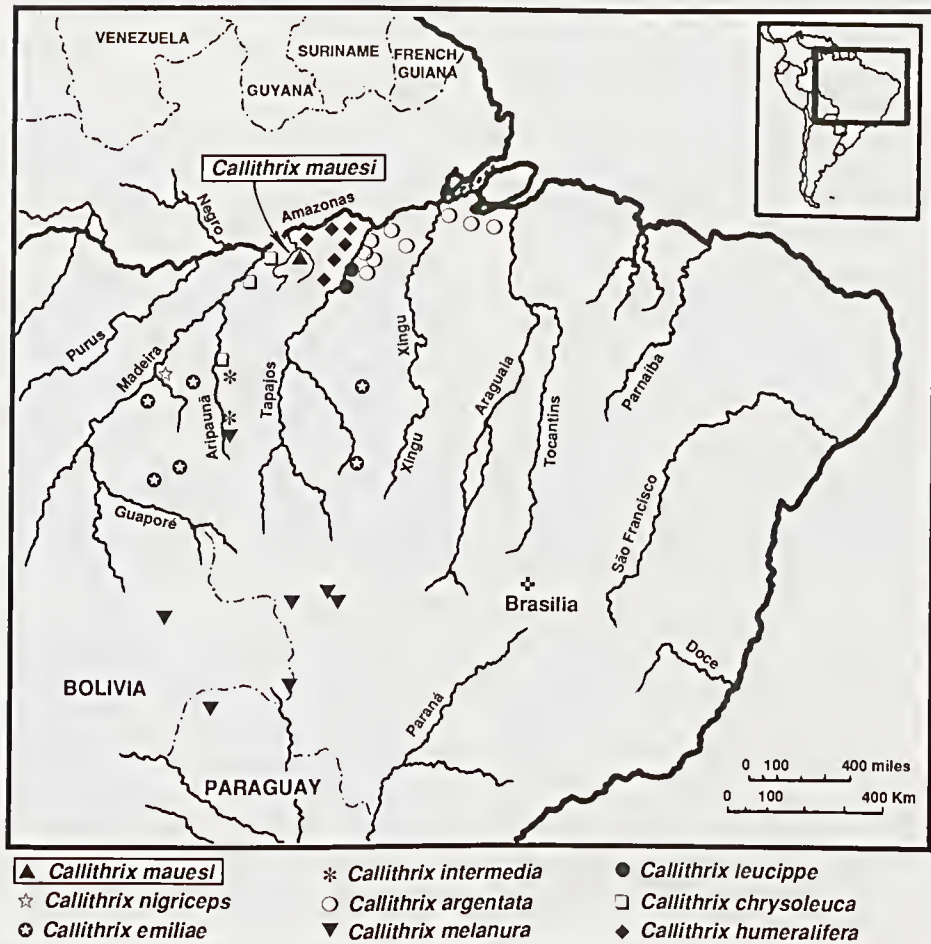


Figure 6. Map of the distribution of the *Callithrix argentata* group of marmosets showing the location of the type locality of *C. mauesi* (illustration by Stephen D. Nash).



Figure 7. Views of the skull of the adult male holotype of *Callithrix mauesi*.

Table 3. Cranial and dental measurements of the holotype (σ^7) of *Callithrix mauesi* (in millimeters).

Skull and mandible			
Greatest Skull Length (SL)			47.57
Zygomatic Width (ZW)			31.03
Biorbital Width (BW)			25.72
Postorbital Width (PW)			23.40
Nasion-Basion			32.93
Basion-Prosthion			35.72
Biauricular Breadth			27.50
Height of Canine (CH)			5.25
Length of Mandible (ML)			32.20
Across First Molars (AM)			16.40
Condylar Length (CL)			32.21
Condylar Height (CoH)			13.60
Across Canines			11.90
Dental Field (P ₂ —M ₂)			9.91
Premaxillary Height			7.97
Intradentale Superior to Premaxilla-Maxilla Junction at Alveolus (IS-PM)			4.85
Intradentale Superior to Nasion (IS-NA)			14.00
Intradentale Superior to Posterior Nasal Spine (IS-PNS)			16.30
Bregma to Nasion (BR-NA)			25.31
Nasion to Fronto-Malar Junction at Orbit (NA-FM)			14.60
Fronto-Malar Junction to Pterion			8.14
Fronto-Malar Junction to Zygomaxillare Superior (FM-ZS)			7.41
Fronto-Malar Junction to Maxillary Tuberosity (FM-MT)			13.48
Zygomaxillare Inferior to Premaxilla-Maxilla Junction at Alveolus (ZI-PM)			13.67
Zygomaxillare Inferior to Zygomaxillare Superior (ZI-ZS)			8.80
Zygomaxillare Inferior to Maxillary Tuberosity (ZI-MT)			6.90
Anterior Teeth		Cheek Teeth	
I ¹ Length	1.88 (MD)	P ₂ Length	2.86
I ¹ Breadth	1.77 (LL)	P ₂ Breadth	1.78
I ¹ Height	3.71	P ₄ Length	2.14
I ² Length	2.20 (MD)	P ₄ Breadth	1.66
I ² Breadth	1.88 (LL)	M ₁ Length	2.52
I ₁ Length	1.27 (M2)	M ₁ Width	2.13
I ₁ Breadth	1.72 (LL)	M ₂ Length	2.03
I ₁ Height	3.50	M ₂ Width	1.74
I ₂ Length	1.56 (MD); 2.44 (BL)		
I ₂ Height	4.0 (LL)		
C ₁ Length	2.88		
C ₁ Breadth	1.81		

MD — Mesio-distal length

LL — Labio-lingual breadth

BL — Bucco-lingual breadth



CONSERVATION STATUS OF THE NEW SPECIES

Very little is known of the conservation status of *Callithrix mauesi*, since it has thus far been observed in only one locality, the west bank of the Rio Maués-Agü across from the town of Maués. However, the area in which it occurs is still in good condition, and little disturbed. Assuming that the animal is as adaptable to secondary forests and other man-induced habitat modifications as are other Amazonian *Callithrix*, it is probably not in any immediate danger at this time.

PRIMATE DIVERSITY IN BRAZIL

The addition of *Callithrix mauesi* to the primate fauna of Brazil, together with the recent descriptions of *Callithrix nigriceps* (Ferrari and Lopes, 1992) and *Leontopithecus caissara* (Lorini and Persson, 1990), brings the total number of primate species in Brazil to 68 in two (or three if the Callimiconidae is considered distinct) families and 16 genera. This is by far the richest primate fauna in the world (Table 4), and underlines yet again the great importance of Brazil in international efforts to conserve a representative cross-section of the Order Primates. These 68 species represent more than one quarter of all living primate species, and fully 30 (44.1%) of these are endemic to Brazil and found nowhere else on earth. These 68 species also represent more than three-quarters of all primate species in the Neotropics (68/87 spp. or 78.2%). In international terms, only Madagascar, Indonesia and Zaire can compare to Brazil, and none of these has even half the number of species (although Madagascar has five families, 14 genera, 30 species and approximately 50 taxa, all but two of which are endemic).

Table 4. Top countries in the world for primate diversity.

Country	# genera	# species	# endemics	% endemics
1. Brazil	16	68	30	44.1%
2. Madagascar	14	30	28	93.3%
3. Zaire	13-15	30-32	3	~ 10%
4. Peru	12	30	4	13.3%
5. Indonesia	9	34	18	53%

The addition of two new species to the genus *Callithrix* in 1992, the recognition of 12 *Callithrix* as full species by de Vivo (1988) and a thirteenth, *C. kuhlii*, by Mittermeier *et al.* (1988), gives this genus the largest number of species (15) of all Neotropical primate genera, at least for the time being. However, it is likely that it will be exceeded by *Saguinus*, currently with 12 species and 33 taxa, *Callicebus*, with 13 species and 24 taxa, and perhaps even *Aotus* (9 species, 11 taxa), when other new



Figure 8. Color illustrations of a. *Callithrix mauesi*, b. *Callithrix humeralifera*, and c. *Callithrix chrysoleuca*.

forms are described and thorough revisions made. Unlike these other very diverse genera, *Callithrix* is almost entirely endemic to Brazil, with only one species, *C. melanura*, extending into non-Brazilian territory in Bolivia and Paraguay (Herskovitz, 1977; Stallings and Mittermeier, 1983).

The discovery of *C. mauesi* and *C. nigriceps* also demonstrates how little we still know of the vast Amazon region, even with relatively well-studied groups like the nonhuman primates, and emphasizes yet again the need for more basic research and exploration.



Figure 9. Photographs of live *Callithrix humeralifera* (left) and *Callithrix chrysoleuca* (right).

ACKNOWLEDGEMENTS

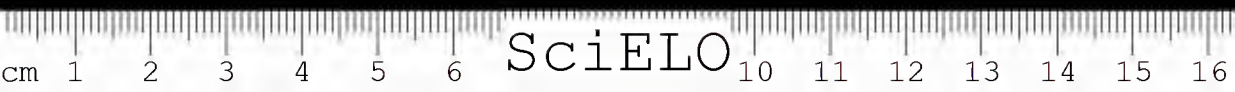
The authors would like to thank Stephen Nash for producing the drawings that illustrate this paper, John Fleagle for his help in describing the skull, and Mario de Vivo for his critical comments on early drafts of the manuscript. The senior author would like to express his special thanks to Pierree Onthank for first having pointed out the existence of this species to him, and to David Oren for his input at various stages of this project. Support for this publication was provided by Conservation International.

REFERENCES

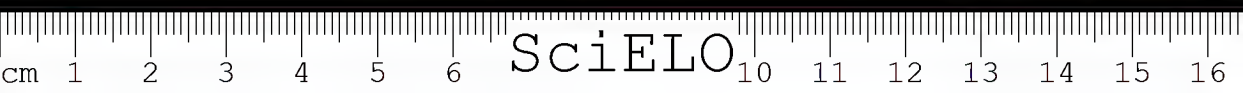
- AVILA-PIRES, F.D. 1986. On the validity and geographical distribution of *Callithrix argentata emiliae* Thomas, 1920 (Primates, Callitrichidae). In: de Mello, M.T. *A Primatologia no Brasil*, v. 2, Sociedade Brasileira de Primatologia.
- COIMBRA-FILHO, A.F. & MITTERMEIER, R.A. 1973. New data on the taxonomy of the Brazilian marmosets of the genus *Callithrix* Erxleben, 1777. *Folia primatol.*, 20:241-264.
- HERSHKOVITZ, P. 1968. Metachronism or the principle of evolutionary change in mammalian tegumentary colors. *Evolution*, 22: 556-575.
- HERSHKOVITZ, P. 1977. *Living New World Monkeys*, v. I, Chicago, University of Chicago Press. xvi + 1117 pp.
- HERSHKOVITZ, P. 1990. Origin, speciation, and distribution of South American titi monkeys, genus *Callicebus* (Family Cebidae, Platyrrhini). *Proc. Acad. Nat. Sci. Philadel.*, 140 (1): 240-272.
- FERRARI, S.F. & LOPES, M.A. 1992. A new species of marmoset, genus *Callithrix* Erxleben, 1777 (Callitrichidae, Primates), from western Brazilian Amazonia. *Goeldiana Zoologia*, no. 12.
- LORINI, M. & PERSSON, V.G. 1990. Nova espécie de *Leontopithecus* Lesson, 1840, do sul do Brasil (Primates, Callitrichidae). *Bol. Museu Nacional (Zoologia)* 138: 1-14.
- MITTERMEIER, R.A., RYLANDS, A.B., & COIMBRA-FILHO, A.F. 1988. Systematics: Species and subspecies — an update. In: Mittermeier, R.A., Rylands, A.B., Coimbra-Filho, A.F. and Fonseca, G.A.B. (eds.) *Ecology and Behavior of Neotropical Primates*, v. 2, Washington, D.C., World Wildlife Fund-U.S.
- STALLINGS, J. & MITTERMEIER, R.A. 1983. The black-tailed marmoset (*Callithrix argentata melanura*) recorded from Paraguay. *Amer. J. Primatol.*, 4: 159-163.
- de VIVO, M. 1985. On some monkeys from Rondônia, Brasil (Primates: Callitrichidae, Cebidae). *Pap. Avulsos Zoo.*, São Paulo, 36: 103-110.
- de VIVO, M. 1988. *Sistemática de Callithrix Erxleben, 1777*. Ph.D. thesis, University of São Paulo.
- de VIVO, M. 1991. *Taxonomia de Callithrix Erxleben, 1777* (Callitrichidae, Primates). Fundação Biodiversitas, Belo Horizonte, Minas Gerais, Brazil. 105 pp.



SciELO



SciELO



SciELO